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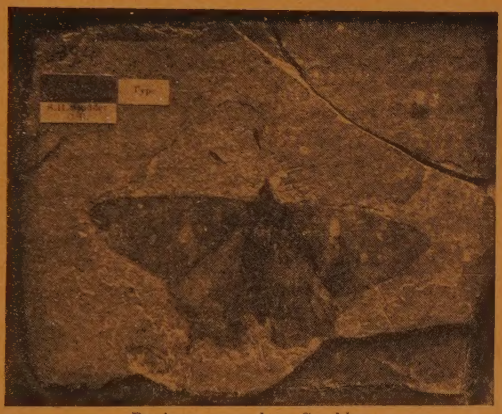

Prodryas persephone Scudder.

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PSYCHE

VOL. XXIII FEBRUARY, 1916 No. 1

THE IMMATURE STAGES OF *TROPIDOSTEPTES CARDINALIS* UHLER (CAPSIDAE, HEMIPTERA).[1]

By M. D. Leonard,
Ithaca, New York.

On June 10, 1908, Prof. C. R. Crosby first noticed that the leaves of an ash tree near the Cornell Insectary were being slightly injured by a Capsid which by that date had become adult. In the early spring of 1910 he prepared descriptions of the stages from nymphs reared on twigs forced out in the insectary, but no adults were obtained. In the spring of 1913 Professor Crosby called the writer's attention to the problem and the study of the immature stages of the insect was again taken up. The nymphs were redescribed and adults were obtained which were identified as *Tropidosteptes cardinalis* Uhler.

Detailed observations have not been made on the length of time required for the nymphs to complete their growth on the trees but on May 23, 1914, two first-stage nymphs were still present and, on June 4, the first fifth-stage nymph was observed. The insect spends the winter in the egg stage. The eggs are probably inserted during late summer into the smaller twigs but have not been definitely located. The following descriptions of the nymphal stages are based on notes made during the spring of 1914 and of 1915. The drawings were made by the writer with the exception of that of the fourth nymphal stage which was made by Miss Anna C. Stryke. The injury to the foliage consists of a yellow spotting or stippling which in more severe cases causes the leaves to crumple in places.

Stage I (Fig. 1): Length, .85 mm.; greatest width of abdomen, .45 mm. Ground color reddish; head strongly suffused with dusky; thorax with a large

[1] Contribution from the Department of Entomology of Cornell University.

dusky spot on each segment, not reaching the lateral margin and interrupted by a median red line running the length of the thorax. This latter crosses, for a short distance, a procurved line of red on the vertex which extends almost to the cephalic border of the eyes. Abdomen red, sometimes mottled with red of a darker shade; opening of dorsal gland indicated by a small dusky spot. Eyes dark reddish; antennæ pale, suffused slightly with dusky, paler at the tip of the segments, whole of last segment reddish and slightly swollen. Legs pale, suffused slightly with dusky, tarsi slightly darker. Beak same as legs, extreme tip somewhat darker.

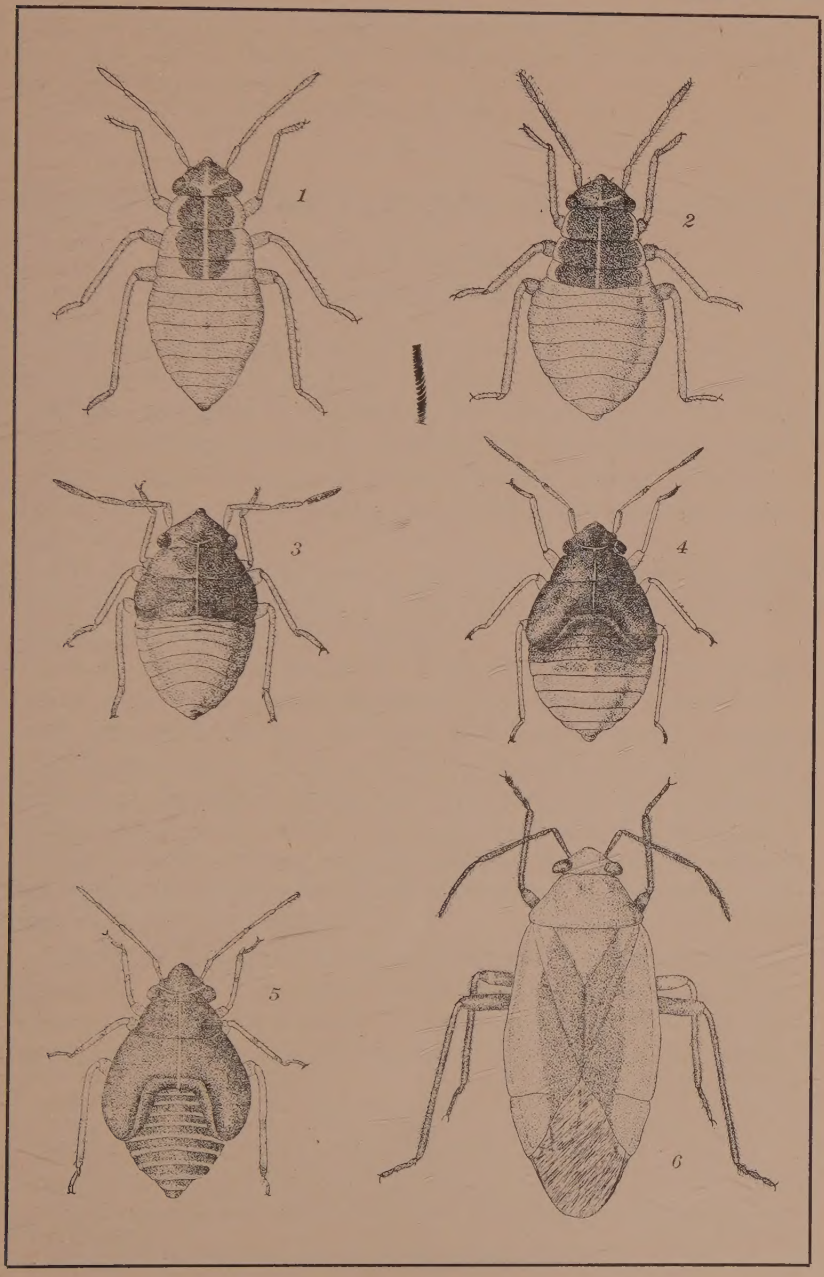
Stage II (Fig. 2): Length, 1.3 mm.; greatest width of abdomen, .7 mm. Ground color of head and thorax shining dark red, but strongly suffused with blackish, except the lateral margins, narrowly, of the thorax and a narrow median line which is as in preceding stage. Abdomen shining dark red, opening of dorsal gland indicated by a dusky spot. Eyes dark reddish; antennæ, beak and legs about the same as in preceding stage.

Stage III (Fig. 3): Length, 1.85 mm.; greatest width of abdomen, .975 mm. Head and thorax now wholly suffused with blackish except for a narrow reddish median line which terminates on the vertex in a procurved line extending towards either eye. Abdomen shining dark red, opening of dorsal gland indicated by a blackish spot. Eyes dark reddish, antennæ pale yellowish, slightly grayish distally, terminal segment wholly reddish. Legs pale yellowish washed with grayish, much as in preceding stages; tarsi slightly dusky. Wing-pads just becoming apparent on meso- and meta-thorax.

Stage IV (Fig. 4): Length, 2.2 mm.; greatest width, across wing-pads, 1.42 mm., giving body a very broad appearance. Head and thorax as in preceding stage. First three abdominal segments and a transverse spot on fourth segment on either side of the gland blackish. Rest of abdomen red. Eyes dark reddish. Antennæ as in preceding stage. Legs pale yellowish, terminal segment of tarsi suffused with dusky; hind femora with two rather faint dusky rings near the tip. Under side of insect dark red; basal segment and extreme tip of beak blackish, remainder slightly tinged with pinkish. Wing-pads extend back to third abdominal segment.

Stage V (Fig. 5): Length, 2.8 mm.; greatest width, across wing-pads, 1.8 mm. Head and thorax, including wing-pads, now shining black, except for the narrow, red, median line which meets a procurved line of the same color on the head, as in the preceding stages. Abdomen shining black, hind border of each segment broadly red. Eyes very dark reddish. First three segments of the antennæ, yellowish, suffused with dusky, especially at center of first segment and at tip and base of segments two and three; fourth segment red. Legs yellowish, the second segment of the tarsi, tip of tibiæ, a band on tibiæ, and two more or less distinct bands on femora, dusky. Wing-pads extend back almost to sixth abdominal segment.

Adult (Fig. 6)—*Female:* Length, about 5.5 mm.; greatest width, about 2.5 mm. Dark red with a broad black stripe extending from hind border of pronotum, but not including scutellum, to tip of wings. A small whitish spot on membrane where it meets tip of cuneus. Dorsum bare, finely punctate. Head shining, not punctate. Front of head with a black median stripe starting about even with antennal tubercles and running a short distance onto first segment of beak. Eyes black. Antennæ shining black, clothed with fine, short, golden hairs. Legs, except coxæ and trochanters, shining black; fore and middle femora with a brownish



LEONARD—*Tropidosteptes cardinalis.*

yellow band near tip; base of tarsi slightly lighter; coxæ and trochanters yellowish or pinkish. Thorax beneath pinkish; venter reddish. First segment of beak brownish yellow, remainder blackish.

Male, about 5 mm. in length; similar to female.

PROTHETELY IN THE ELATERID GENUS MELANOTUS.

By J. A. Hyslop,
Bureau of Entomology, Washington, D. C.

Two papers on the abnormal phenomenon termed prothetely appeared last year in Psyche. In one of these papers[1] six bibliographical references were given on the subject and in the other paper[2] a seventh was added to this list. Dr. Adam Böving brought another interesting paper on the same subject, published in 1914,[3] to my attention, and in looking over the literature two more papers were located.[4,5]

The present paper deals with a very striking case observed at the United States Entomological Laboratory in Hagerstown. The subject was *Melanotus communis* Gyll.

On May 18, 1915, Mr. J. J. Davis sent the writer fifty-eight living larvæ of *Melanotus communis* Gyll., collected near Cincinnati, Ohio, with the note that they were found damaging corn on river bottom land. These larvæ were shipped in salve boxes filled with moist Sphagnum moss, and when received were isolated in similar boxes partly filled with moist earth and fed seed corn. The boxes were all placed in galvanized iron trays and the contents examined, cast skins removed, soil moistened when necessary, and new food supplied, weekly.[6]

Strickland[7] suggested as an explanation of the phenomenon of prothetely that it "is usually caused by keeping the larvæ at an abnormally high temperature." The temperature to which this particular larva was subjected could not have varied to any appre-

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[1] Williams, F. X., 1914, Psyche, Vol. XXI, p. 126.

[2] Barber, H. S., 1914, Psyche, Vol. XXI, p. 190.

[3] Kemner, A., 1914, Ent. Tidsk. (Swedish), Vol. XXV, pt. 1–2, pp. 87–95.

[4] Tragardh, I., 1912, Fauna och Flora, pp. 245–255.

[5] Peyerimhoff, P. de, 1911, Bull. Soc. Ent. France, p. 327.

[6] The writer was ably assisted in this work by Messrs. H. L. Parker and W. E. Pennington of the Station staff.

[7] Strickland, E. H., 1911, Biol. Bull., Vol. 21, pp. 313–327.

ciable extent from that of the fifty-seven other larvæ of the same series in the same trays. Up to the date of writing, September 23, 1915, three adults have emerged from this material, all of which appear to be perfectly normal, only seven of the larvæ have died and the remainder are moulting normally and feeding freely. In this same type of cage and in the same insectary, we have been carrying on experiments with about 2,000 Elaterid larvæ from all parts of the United States and the West Indies.

However, this is the only instance of prothetely that we have ever observed. The soil with which these cages are filled is all

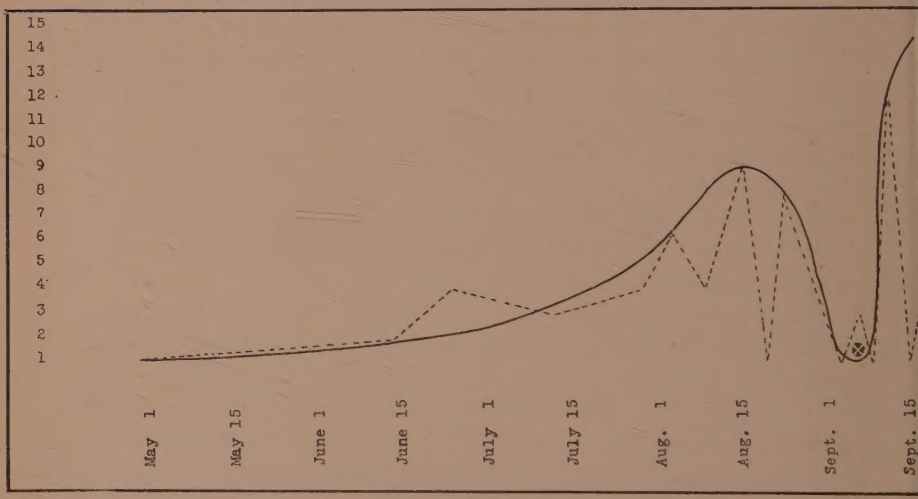
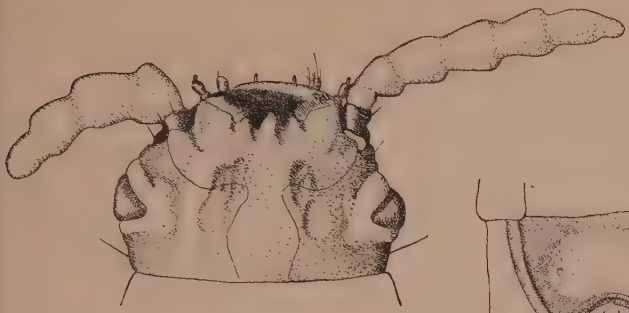


Fig. 1. Plotted curve of *Melanotus* molting periods. Cross indicates point at which prothetelous larva appeared. The dotted lines connect actual record points.

taken from one potting bench. The amount and kind of food, I believe, can be eliminated as a factor in this particular instance as our larvæ are always supplied with an excess of food. The lids of the boxes, which we use as cages, fit with varying degrees of tightness and the rate of evaporation is, therefore, very inconstant in any given series of cages. On account of this, the cages are only watered when, in the judgment of the examiner, it is necessary. This introduces a large personal factor and could easily result in a cage becoming much more dry or moist than the other cages of the same series. As this seems to be the only variable, I am inclined

nal and prothetelous larva and normal pupa of *Melanotus communis*. Fig. 1, dorsum of normal Fig. 2, ventron of pupa. Fig. 3, dorsum of prothetelous larva. Fig. 4, ventron of prothetelous Fig. 5, lateral aspect of prothetelous larva.



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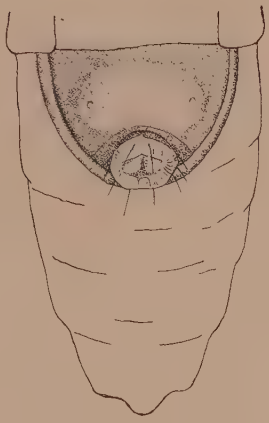

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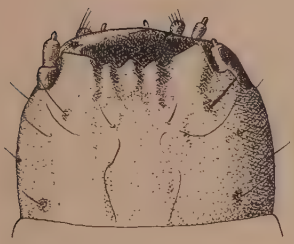

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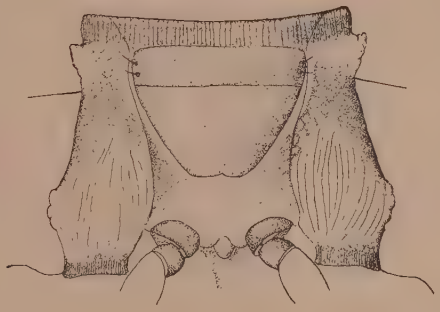

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Me'anotus communis normal and prothetelous larva. Fig. 1, dorsum of the head of prothetelous larva. Fig. 2, prosternum of normal larva. Fig. 3, 9th and 10th abdominal segments of prothetelous larva. Fig. 4, dorsum of head of normal larva. Fig. 5, prosternum of prothetelous larva.

to believe that an abnormal humidity factor at or shortly before the time of pupation is the causative stimulus of this phenomenon.

The accompanying plotted curve (Fig. 1) indicates the period in the activity of the series, when the individual in question transformed to the abnormality herein described. The cages had all been examined on September 3. In examining the cages September 8, the prothetelous larva was discovered. This was a period of minimum moulting immediately preceding a very abrupt and extensive moulting period. The moulted skin of this larva was perfectly normal in every respect and, by careful comparative measurements, was found to be very nearly identical with the last larval skin; that is, the skin shed when a pupa is formed under normal conditions. The table (Fig. 2) shows the measure-

	Penultimate Instar.	Ultimate Instar.	Larval Skin of Prothetelous Larva.
Length of dorsum of 9th abdominal segment . .	2.782	3.103	3.156
Width of dorsum of 9th abdominal segment. .	1.979	2.193	2.193
Length of dorsum of 1st thoracic segment. . .	1.498	1.819	1.712

Fig. 2. Table showing comparative measurements of larval skins of penultimate instar, ultimate instar and prothetelous larvæ.

ments of this cast skin as compared with a larval skin from the ultimate and penultimate instar.

This prothetelous larva is (Plate II, Figs. 3, 4, and 5) predominantly larviform. The abdomen is typically so and normally chitinized, with the exception of a pair of membranous papilliform areas on the posterior margin of each sternite except the ninth (Plate III, Fig. 3). The thoracic sterna are membranous except a triangular area on the prosternum (Plate III, Fig. 5), which is normally chitinized. The membranous areas are decidedly protuberant. The coxæ and trochanters are larviform with typical pupiform femora, tibiæ and tarsi. The ventral part of the protergite is membranous and very much expanded posteriorly. A pair of anterior and a pair of posterior papillæ are borne on the spiracular

area of the protergum (Plate III, Fig. 5). The mouthparts are all larviform. The basal joint of the antennæ is larviform and chitinized; the remainder of the antennæ is membranous and typically pupiform. The eyes are typically pupiform with a membranous area surrounding them, which connects the eye with the larviform cheeks. The wing pads are well developed, but the elytral pads do not bear the normal striation found in typical pupa. The base of the wing pads is surrounded by a membranous area and the pads seem to arise in the spiracular area. The specimen measures 23 mm. in length, the dorsum of the ninth abdominal segment measures 2.996 mm. in length, and 2.14 mm. in width. The first thoracic tergite is 1.498 mm. long.

This particular case of prothetely seems to be a carrying forward of larval characters into the pupal stage rather than a carrying back of pupal characters into the larval stages. Such being the case, it is possible and even probable that by the successful emergence of such a pupa some larval characters would be carried into the adult stage, and if such characters were of some material advantage to their possessors natural selection might here find variations which could lead to the production of such species with larviform adults as do exist in certain other Coleopterous genera.

TWO NEW THYSANOPTERA FROM WEST AFRICA, WITH A NOTE ON THE SYNONYMY OF THE *PHLŒOTHRIPIDÆ*.

By J. Douglas Hood,
United States Biological Survey, Washington, D. C.

The new species described below were sent to me in October, 1915, from Ossidinge, Kamerun, by Lieut. A. W. Jobbins-Pomeroy, of the Nigeria Regiment, West African Frontier Force. Partly in recognition of his devotion to entomology under such adverse circumstances, and partly as a mark of personal regard, I have taken great pleasure in naming one of the species in his honor.

Suborder Tubulifera Haliday.

Family Phlœothripidæ Uzel.[1]

1836. *Tubulifera* ("Stirps et Fam.") Haliday, Ent. Mag., Vol. III, p. 441.
1895. *Phlœothripidæ* Uzel, Monogr. Ordn. Thys., p. 223.
1896. *Tubuliferidæ* Beach, Proc. Iowa Acad. Sci., Vol. III, p. 214.
1912. *Ecacanthothripidæ* Bagnall, Ann. Mag. Nat. Hist., Ser. 8, Vol. X, p. 222.
1915. *Eupathithripidæ* Bagnall, Journ. Linn. Soc., Zool., Vol. XXXII, No. 220, p. 200.

In explanation of the above synonymy, it may be said that on the accompanying plate are given several detail drawings, which show the close similarity obtaining between *Phlœothrips*, *Acanthothrips*, and *Pselaphothrips*, and, consequently, the relationship of all with *Eupathithrips* and *Sedulothrips*. They are discussed below under the species headings.

Acanthothrips nodicornis Reuter, Fig. 7. (Drawn from a specimen ex collection O. M. Reuter, from Helsingfors, Finland.) It will be noted that the eyes of this species differ in no essential features from those of *Pselaphothrips* (Fig. 2); they are as finely and closely faceted, fully as prominent, very nearly as contiguous anteriorly and show almost as great a tendency to surround the ocelli; while on the ventral surface, it may be added, they are just as well separated.

Acanthothrips albivittatus Hood, Fig. 6. The antennæ of this species are very similar to those of *Pselaphothrips*, in color, form, and chætotaxy. With but few exceptions, every bristle and every sense cone finds its analogue in *Pselaphothrips* (Fig. 3). Furthermore, the antennæ are inserted more on the ventral than on the dorsal surface of the head; and the latter, while not crested dorsally, is nevertheless slightly elevated along the median line.

Acanthothrips magnafemoralis Hinds, Fig. 5. The third antennal segment is in this more slender than in the other species of the genus, and approaches the *Pselaphothrips-Eupathithrips-Sedulothrips* type very closely.

Phlœothrips coriaceus Haliday, Fig. 4. (Drawn from a specimen ex collection R. S. Bagnall, from Balsall Common, Warwickshire,

[1] The names Æolothripidæ, Thripidæ, and Phlœothripidæ were proposed by Uzel in 1895, and should be credited to him, instead of to Haliday. The latter proposed three family names—Coleoptrata, Stenoptera, and Tubulifera,—the last being employed also as a subordinal term. According to modern ideas, Haliday's names are invalid, because not formed from the oldest genus of the family by the addition of -idæ to the root.

England.) Here, again, the same general type of chætotaxy prevails, the number and arrangement of sense cones and bristles being almost identical.

This disposes of all the characters used in the separation from the Phlœothripidæ of the genera allied to *Eupathithrips*, with the exception of that of the long mouth cone. This character, however, frequently varies in closely allied species of the same genus; and in the genera grouping themselves about *Liothrips*, the mouth cone is sometimes as elongate as here.

These are, in detail, the reasons for the sinking of Bagnall's recently diagnosed family Eupathithripidæ as a synonym of the Phlœothripidæ. It will be seen that the twelve or thirteen differences given by him for the separation of this group are broken down in a most interesting manner by the new genus described below as *Pselaphothrips*, which is in nearly all respects intermediate between *Eupathithrips* Bagnall and *Acanthothrips* Uzel[1]; and the last genus is very closely allied indeed to *Phlœothrips* Haliday, the type of its family. *Eupathithrips* and its allies, then, for the present, at least, are best considered part of a moderately large complex represented by *Phlœothrips*, *Ecacanthothrips* and *Sedulothrips*. The last two are the extremes of two different lines of specialization; and to separate either from the parent stem with the rank of family would, I believe, be a step backward, and one away from our ideal of a true phylogenetic classification.

Genus Podothrips Hood.

1913. *Podothrips* Hood, Ins. Insc. Menstr., Vol. I, p. 67.

Body depressed, glabrous. Head longer than wide, much narrowed toward base, widest behind eyes, about equal in length to prothorax, evenly declivous in front; cheeks nearly smooth, without spiniferous tubercles. Ocelli placed far forward, the median one between basal segments of antennæ; posterior ocelli widely separated. Antennæ eight-segmented, the last two segments not compactly united. Mouth cone blunt, much shorter than its width at base. Prothorax about as long as head, about twice as wide at base as at apex, lobed behind, with median dorsal thickening, lateral outline concave, only the two pairs of bristles at posterior angles well developed. Legs of moderate length, stout; fore femur nearly as long and broad as head; fore tibia with a stout tooth at tip in both sexes; fore tarsus armed with a

[1] Karny's *Acanthothrips grandis* described from Argentina (Zoöl. Ann., Vol. IV, p. 324, 1912), is almost certainly a *Eupathithrips*, though a more extensive description or an examination of the type specimen will be necessary before this point can be determined. There is nothing in the description to exclude the species from *Eupathithrips silvestrii* (Buffa).

long hooked tooth. Wings slender, narrowed at middle; fringe sparse and weak, on fore wing not double along posterior margin near apex.

Type: Podothrips semiflavus Hood.

The new African species described below has made necessary two or three slight changes in the original description of the genus. The two known species are strictly congeneric, though differing abruptly in color and certain details of structure.

Key to Species.

a. Yellow, with head, sides of metathorax, and last three abdominal segments abruptly dark brown; cheeks rounded behind eyes, not toothed *Podothrips semiflavus* Hood.

aa. Dark blackish brown, with antennal segments 3–7, the fore tibiæ, all tarsi, and first abdominal segment yellow; cheeks with a distinct, lateral, acute tooth behind eyes..... *Podothrips denticeps* Hood.

Podothrips denticeps sp. nov.

Female: Length about 1.8 mm. Surface shining. Color dark blackish brown, with antennal segments 3–7, fore tibiæ, all tarsi, and first abdominal segment, pale lemon yellow; wings pale yellowish, darker toward base.

Head 1.35 times as long as wide, with a distinct, lateral, acute, and more or less forwardly directed tooth just behind eye, thence arcuately converging to near base, where there is a slight neck-like constriction; vertex rounded and evenly declivous; dorsal surface without sculpture; cheeks very slightly roughened, sparsely and briefly spinose; postocular bristles slightly knobbed, two-thirds as long as eyes, situated close to lateral margins of head. Eyes one-third as long as head and three-fourths as wide as their interval, not protruding, ventral extent very slightly less than dorsal. Ocelli anterior in position, the posterior pair near the anterior angle of eyes, the median ocellus between basal segments of antennæ. Antennæ nearly 1.5 times as long as head, moderately slender; segment 1 slightly broader at base than ventral length; 2 narrower than 1, nearly twice as long as wide; 3 elongate-oval, pedicellate, with a slight notch on inner surface at basal third, nearly twice as long as wide; 4–6 elongate-oval, subequal in length and successively decreasing in width, briefly pedicellate, 4 slightly broader than 2 and 3; 7 slender, very slightly longer than 6, about 2.4 times as long as wide; 8 fusiform-truncate, very slender and nearly 0.9 as long as 7, about four times as long as greatest width; sense cones and bristles unusually short and weak; segments 1, 2, and 8 nearly concolorous with head, 2 yellow in outer apical half; intermediate segments clear lemon yellow, except 7, which is lightly washed with brown.

Prothorax about five-sixths as long as head and (inclusive of coxæ) twice as wide at base as at apex and 0.7 as long as wide; lateral outline concave; surface smooth; median dorsal line distinctly chitinized; all usual bristles present, the anterior marginal pair visible only under highest magnifications; the anterior angular and mid-lateral pairs only slightly larger; the two pairs near the posterior angles and the coxal pair knobbed, nearly as long as postoculars. Pterothorax about as wide as

base of prothorax, sides nearly straight and parallel. Legs moderately stout; fore femur nearly as long as head and about twice as long as greatest width; fore tibia stout, scarcely as long as width of femur, with a stout, prominent tooth on inner side of apex, just basal to which is a setose tubercle; fore tarsus with a long, strong, hooked tooth about two-thirds its length, the inner surface of tooth with a setose tubercle at apical two-fifths. Wings long, slender, weak, slightly suffused with yellowish (particularly toward base), without double subapical fringe.

Abdomen slender, slightly wider than pterothorax. Tube nearly 0.6 as long as head, basal fourth slightly swollen, nearly 2.5 times as wide as apex; terminal bristles brown, about 1.5 times as long as tube; all other abdominal bristles pale, in great part knobbed.

Measurements of holotype (female): Length 1.81 mm.; head, length 0.252 mm., width 0.186 mm.; prothorax, length 0.205 mm., width (inclusive of coxæ) 0.300 mm.; pterothorax, width 0.288 mm.; abdomen, width 0.307 mm.; tube, length 0.144 mm., width at base 0.074 mm., at apex 0.030 mm.

Antennal segments:	1	2	3	4	5	6	7	8
Length (μ)	39	52	51	48	46	47	48	42
Width (μ)	40	28	28	29	27	25	20	11

Total length, 0.373 mm.

Described from a unique female collected by Lieut. A. W. Jobbins-Pomeroy, on grass, near Ossidinge, Kamerun, in October, 1915.

Genus **Pselaphothrips** nov.

($\psi\eta\lambda\alpha\phi\sigma\omega$, to feel[1]; $\Theta\rho\iota\psi$, a wood worm.)

Body not depressed. Head much less than twice as long as wide, and more than twice as long as prothorax, compressed and subcarinate above; cheeks nearly parallel, not at all swollen toward base, and with a few small spiniferous tubercles; vertex sulcate and nearly overhanging in front of anterior ocellus. Eyes moderate in size, finely and closely faceted, scarcely prominent or protruding, well separated anteriorly, slightly reniform, exhibiting little tendency to surround the ocelli. Ocelli anterior, not set on an elevation, the median one directed nearly forward, the posterior pair approximate. Antennæ eight-segmented, nearly twice as long as head, scarcely "set on ventral surface of head," moderately slender, intermediate segments stout (that is, for the group; in the genotype scarcely three times as long as wide), clavate, distally abruptly narrowed; sense cones long and slender. Mouth cone very long and slender, attaining base of mesosternum. Prothorax broadly arcuate (scarcely emarginate) in front, its median dorsal length more than one-third the width across coxæ. Legs moderately slender; fore femora not swollen, with an acute tooth on inner surface near apex; fore tarsi armed. Wings slender, of equal width throughout; fore pair with a subbasal dark band and many accessory hairs on posterior margin.

Type: Pselaphothrips pomeroyi sp. nov.

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[1] In reference to the apparently very sensitive antennæ,—although the function of the conidia is presumably olfactory instead of tactile.

This genus is closely allied to *Acanthothrips*, *Eupathithrips*, and *Sedulothrips*, but differs from the last two in a number of characters which Bagnall considers of family importance. From *Acanthothrips* it may be separated by the long mouth cone and the compressed and subcarinate dorsum of the head. It is the only member of the *Eupathithrips* group occurring outside the Neotropical region.

Pselaphothrips pomeroyi sp. nov.

Female: Length about 3 mm. Color dark blackish brown, with purple hypodermal pigmentation in head, thorax, and abdomen; antennæ and legs concolorous with body; tube paler in apical half.

Head 1.44 times as long as wide, compressed and subcarinate above; cheeks nearly parallel, not at all swollen toward base, anteriorly roundly converging to eyes, set with a few small spiniferous tubercles; vertex sulcate and nearly overhanging in front of anterior ocellus; postocular bristles short, scarcely one-fourth as long as eyes, dilated at tip. Eyes very finely and closely faceted, not at all protruding, nearly 0.4 as long as head, well separated anteriorly, slightly reniform, showing little tendency to surround the ocelli. Ocelli anterior, not set on an elevation, the median one directed nearly forward and distinctly removed from the approximate posterior pair. Antennæ about 1.9 times as long as head, moderately slender, uniform dark blackish brown in color; segments 3–6 clavate, abruptly narrowed apically, urn-or vase-shaped, 3–5 about 2.7 and 6 about 2.4, times as long as wide; 7 fusiform-truncate, closely united to 8, which is conical; 4 slightly longer than 3; sense cones long, slender, broad at base, those on segment 3 more than half the length of segment; formula: 3, 1–2; 4, 2–2^{+1}; 5, 1–1^{+1}; 6, 1–1^{+1}; 7 with one on dorsum near apex. Mouth cone and palpi very long, the former acute and attaining metasternum.

Prothorax broadly arcuate (scarcely emarginate) in front, its median dorsal length about 0.43 of that of head and 0.37 of the width across coxæ; pronotum nearly smooth, with faint anastomozing lines in posterior third and at sides, and with rather conspicuous short pubescence; median line slightly chitinized; all usual bristles present, and with an additional accessory pair arising mediad and cephalad to the base of the outer posterior pair, all short, dilated at tip, equal to or longer than postoculars, the outer pair at posterior angles longest. Pterothorax about equal in width to prothorax, sides nearly straight, slightly converging posteriorly. Wings long, closely fringed, fore pair with about 35 accessory hairs on posterior margin, and of equal width throughout; fore wings with the scale dark brown and in costal half reticulated similarly to the mesonotum; a dark brown, stippled, granulate, cross band occupies the second sixth, and a lighter brown cloud the apical two-fifths of fore wing, these connected and at least partially traversed by the dark median vein, and in addition connected along both margins of wing by a brown line; third basal spine of fore wing, dark brown, long, slender, and slightly knobbed at tip, set in a small, isolated, stippled, brown spot; first and second basal spines pale, short, stout, and rather strongly dilated at tip, surrounded by an obscurely darkened and sparsely stippled area. Legs moderately slender; fore femora not swollen, with an acute

tooth on inner surface near apex, and with numerous minute spines, stouter on inner surface; fore tibiæ with slenderer spines; fore tarsi with a blunt tooth on inner surface.

Abdomen slender, about equal in width to the pterothorax. Tube about three-fourths as long as head and a little less than half as wide at apex as at base, paler in apical half. Marginal abdominal bristles (excepting those on segment 9, which are pointed and about equal in length to tube) moderately short, blunt, yellowish; terminal bristles slightly longer than tube, brown, pointed.

Measurements of holotype: Length 2.93 mm.; head, length 0.468 mm., width 0.324 mm.; prothorax, length (along median dorsal line) 0.204 mm., width (inclusive of coxæ) 0.558 mm.; pterothorax, width 0.552 mm.; abdomen, width 0.552 mm.; tube, length 0.348 mm., width at base 0.122 mm., at apex, 0.066 mm.

Antennal segments:	1	2	3	4	5	6	7	8
Length (μ)	78	87	165	174	154	94	78	47
Width (μ)	49	41	60	63	57	39	33	18

Total length, 0.877 mm.

Described from one female taken in flight, by Lieut. A. W. Jobbins-Pomeroy, at Ossidinge, Kamerun, in October, 1915.

EXPLANATION OF PLATE IV.

(Minute pubescence not shown.)

Fig. 1. *Podothrips denticeps* sp. nov., head and prothorax, female, holotype.

Fig. 2. *Pselaphothrips pomeroyi* gen. et sp. nov., head and prothorax, female, holotype.

Fig. 3. *Pselaphothrips pomeroyi*, segments 3 and 4 of right antenna, female, holotype.

Fig. 4. *Phlœothrips coriaceus* Haliday, segments 3 and 4 of right antenna, female.

Fig. 5. *Acanthothrips albivittatus* Hood, segment 3 of right antenna, female.

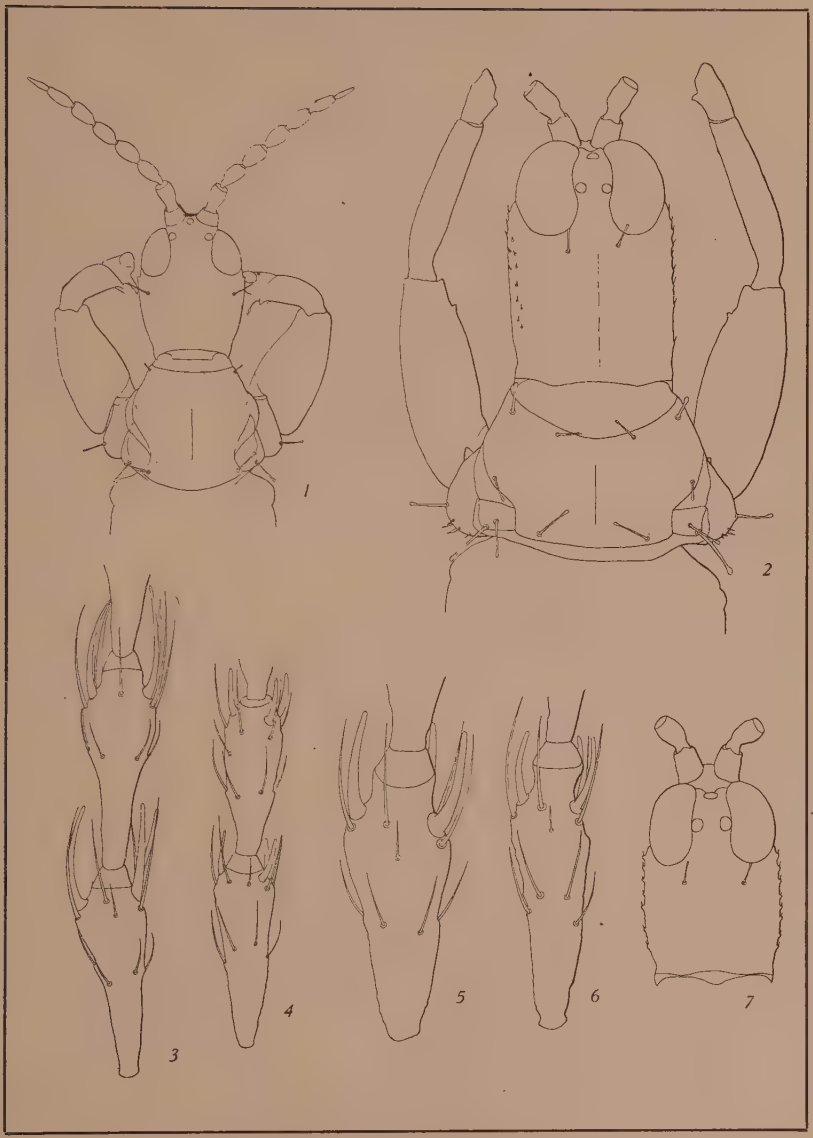
Fig. 6. *Acanthothrips magnafemoralis* Hinds, segment 3 of right antenna, female.

Fig. 7. *Acanthothrips nodicornis* Reuter, head, female.

A PRELIMINARY LIST OF THE ODONATA OF CONCORD, MASS.

By R. Heber Howe, Jr.,
Concord, Mass.

Two years ago I interested one of my students in making a collection of the local dragon flies of Concord for the Thoreau Museum of Natural History of the Middlesex School. This stu-



HOOD—*New Thysanoptera.*

dent, Mr. E. L. Peirson, Jr., collected on occasional afternoons from April until early June, and his material was determined through the kindness of Dr. P. P. Calvert. Mr. Peirson published in the Proceeding of this Museum (Vol. I, p. 41, 1915) a list of twelve species, a few of which had been collected preceding his work and which had been determined by Mr. C. W. Johnson. Mr. Peirson published this list largely because he had secured the second capture of *Williamsonia lintneri* in New England (see also Ent. News, 26, p. 238, 1915), a species never before recorded from these states.

During the past summer, because of continued residence in Concord, I have had the opportunity to collect almost daily, and have visited practically all the ponds and the river valleys, with the result that I am now able to publish a considerable list of species. No doubt further collecting in April and May will add many species in the Gomphinæ. Throughout the summer I had the help of my daughter, Miss Susan A. Howe, and in my determinations I have had the continual aid of Mr. Edward B. Williamson, and also occasionally that of Mr. Richard A. Muttkowski and Dr. E. M. Walker. To these gentlemen I extend my sincere thanks.

In the present list I have made my comparisons of distribution with Dr. Calvert's List of the *Odonata* of New England (Occas. Papers Bost. Soc. Nat. Hist., 7, 1915).

ZYGOPTERA.

AGRIONIDÆ.

CALOPTERYGINÆ.

1. *Calopteryx æquabilis* Say. Collected by Peirson. ♂. May.
2. *C. maculata* (Beauvois) Burm. Common. ♂ and ♀s. May to August 19.

LESTINÆ.

3. *Lestes eurinus* Say. Common. ♂ and ♀s. July.
4. *L. congener* Hagen. Not uncommon. ♂ and ♀s. September 5 to 30. New to Massachusetts.
5. *L. disjunctus* Selys. Three specimens. ♂. September 5 to 18. New to Massachusetts.
6. *L. unguiculatus* Hagen. Very common. ♂ and ♀s. August 15 to September 5. New to Middlesex County.
7. *L. forcipatus* Rambur. Rather uncommon. ♂s. August 31 to September 5.
8. *L. vigilax* Hagen. Rather uncommon. ♂ and ♀s. August 15 to September 5. New to Middlesex County.
9. *L. rectangularis* Say. Uncommon. ♂ and ♀s. August 23 to September 15.

AGRIONINÆ.

10. *Argia violacea* (Hagen) Selys. Common. ♂ and ♀s. May to September 10. New to Middlesex County.
11. *Enallagma laterale* Morse. Rare. ♂s. May to July. Recorded also by Pierson.
12. *E. calverti* Morse. Recorded by Peirson.
13. *E. ebrium* (Hagen) Selys. Common. ♂ and ♀s. August 1 to 15. New to Middlesex County.
14. *E. civile* (Hagen) Selys. Common. ♂ and ♀s. May to September 5.
15. (?) *E. minusculum* Morse. One specimen. ♂.
16. *E. aspersum* (Hagen) Selys. One specimen. ♂. August to September 5.
17. *E. triviatum* Selys. Rather rare. ♂s. August 1.
18. *E. geminatum* Kellicott. A few specimens. ♂ and ♀s. August 1 to September 10. New to Massachusetts.
19. *E. signatum* (Hagen) Selys. Common. ♂s. July to September 5. New to Middlesex County.
20. *E. pollutum* (Hagen) Selys. A few specimens. ♂. August 4. This species has never been recorded south of Maine, and is, therefore, new to Massachusetts.
21. *Ischnura verticalis* (Say) Selys. Uncommon. ♂ and ♀s. August 23 to September 5.

ANISOPTERA.

ÆSHNIDÆ.

GOMPHINÆ.

22. *Gomphus exilis* Selys. Recorded by Peirson. ♀.
23. *G. borealis* Needham. One specimen. ♀. May 1915. New to Massachusetts.
24. *G. spiniceps* (Walsh) Selys. Recorded by Peirson.
25. *G. spicatus* Hagen. Common. ♂ and ♀s. May.
26. *Dromogomphus spinosus* Selys. Rather common. ♂s. July. New to Middlesex County.
27. *Anax junius* (Drury) Selys. Common. ♂ and ♀s. August to September 19.
28. *Æschna clepsydra* Say. Two specimens. ♂. September 10 to September 30.
29. *Æshna constricta* Say. Common. ♂ and ♀s. August to September. New to Middlesex County.
30. *A. umbrosa* Walker. Four specimens. ♀. May to October 17. New to New England.
31. *A. canadensis* Walker. One specimen. ♂. September 5. New to New England.
32. *Epiæschna heros* (Fabricius) Hagen. Recorded by Peirson. ♀. May. New to Middlesex County.
33. *Basiæschna janata* (Say) Selys. Not uncommon. ♂ and ♀s. May. Recorded also by Peirson.
34. *Gomphæschna furcillata* (Say) Selys. Recorded by Peirson. ♀. May. New to Middlesex County.

LIBELLULIDÆ.

CORDULINÆ.

35. *Didymops transversa* (Say) Hagen. Common. ♂s. May.
36. *Tetragoneuria cynosura* (Say) Selys. Recorded by Peirson. May.
37. *Williamsonia linteri* Hagen = *Cordulia linteri* Hagen Recorded by Peirson. May. New to New England.

LIBELLULINÆ.

38. *Libellula cyanea* Fabricius. Rather rare. ♂ and ♀s. August.
39. *L. incesta* Hagen. Abundant. ♂ and ♀s. July to September 10.
40. *L. exusta* Say. Rare. ♀. May to July. Recorded by Peirson.
41. *L. luctuosa* Burm. Common. ♂ and ♀s. July to August 15. New to New England.
42. *L. pulchella* Drury. Common. ♂s. August 18 to September 8.
43. *Plathemis lydia* (Drury) Hagen. Common. ♂s. July to September 3.
44. *Sympetrum rubicundulum* (Say) Kirby. Abundant. ♂ and ♀s. August 7 to September 30.
45. *S. semicinctum* (Say) Kirby. Rare. ♂ and ♀s. August 25 to September 18. New to Middlesex County.
46. *S. vicinum* (Hagen) Kirby. Common. ♂ and ♀s. August 15 to November 7.
47. *S. costiferum* (Hagen) Kirby. Rare. ♂ and ♀s. September 5 to 18. New to Middlesex County.
48. *Celithemis elisa* (Hagen) Walsh. Recorded from Concord in Dr. Calvert's New England list.
49. *C. eponina* (Drury) Hagen. Common. ♂s. July to August.
50. *Perithemis domitia tenera* (Say). Very common. ♂ and ♀s. July to August 3.
51. *Erythemis simplicicollis* (Say). Not uncommon. ♂ and ♀s. July to August 23.
52. *Pachydiplax longipennis* (Burm.) Brauer. One specimen. ♂. August.

SUMMARY.

Number of species formerly known from New England	140
Number added	4
Number of species formerly known from Massachusetts	101
Number added	9
Number of species formerly known from Middlesex County	44
Number added	20
Number now known from Middlesex County	64
Number here listed	52

ELATERIDÆ AND THROSCIDÆ OF THE STANFORD UNIVERSITY EXPEDITION OF 1911 TO BRAZIL.

By J. A. Hyslop,
Bureau of Entomology, Washington, D. C.

Through the kindness of Dr. W. M. Mann, of the Bussey Institution, Harvard University, I have been accorded the great pleasure of examining the *Elateridæ* and the single Throscid collected on the Stanford expedition of 1911 to Brazil.

The collection is small and, contrary to most tropical collections, contains excellent series of several species. It contains three new species, two in the genus *Monocrepidius* and one which I tentatively place in the genus *Drasterius*. The types of these species have been deposited in the Museum of Comparative Zoölogy at Harvard University. The Madeira River collections are remarkably interesting as the fauna of this region is bound to throw light on the relationship between the Andean and Amazonian basin faunæ, and thus to the relationship between the South and Central American faunas. Following is a list of the specimens collected. The *Elateridæ* were all collected by W. M. Mann, Fred Baker and Harold Heath.

THROSCIDÆ.

Drapetes plagiatus (Boh.) Gerst.

Abuná, Rio Madeira, Brazil. (Mann & Baker).....1 specimen

Previously recorded from several parts of Central and South America, and Boheman has recorded the species from San Francisco, Cal.

ELATERIDÆ.

Chalcolepidius candezei Dohrn.

forma typica

Abuná, Rio Madeira, Brazil (Mann & Baker).....2 ♀ specimens

Madeira-Momoré R. R. Co. Camp 39.....2 ♀ specimens

var. a. elytra as in *forma typica*, vestiture of pronotum and ventron green.

Porto Velho, Rio Madeira, Brazil (Mann & Baker).....1 ♀ specimen

var. b. vestiture of elytral striæ ferruginous yellow, pronotum and ventral vestiture green.

Madeira-Mamoré R. R. Co. Camp 39, Rio Madeira, Brazil (Mann & Baker) 7 ♀ specimens

Madeira-Mamoré R. R. Co. Camp 35, Rio Madeira, Brazil (Mann & Baker)
1 ♀ specimen
Madeira-Mamoré R. R. Co. Camp 41, Rio Madeira, Brazil (Mann & Baker)
2 ♀ specimens
Madeira-Mamoré R. R. Co. Camp 43, Rio Madeira, Brazil (Mann & Baker)
1 ♀ specimen

Chalcolepidius limbatus Esch.
Maranguape Mountains, Ceará, Brazil (W. M. Mann)....1 ♂, 1 ♀ specimen
Independéncia, Parahyba, Brazil (Mann & Heath).....1 ♀ specimen

Semiotus furcatus (F.) Lap. var.
Abuná, Rio Madeira, Brazil (Mann & Baker).....1 specimen

Semiotus ligneus (Linn.) Westwood.
Madeira-Mamoré R. R. Co. Camp 39, Rio Madeira, Brazil (Mann & Baker)
1 specimen

Semiotus suturalis (F.) Lap.
Rio Madeira, Brazil (Mann & Baker).....1 specimen

Ischiodontus nigrita Cand.
Pará, Brazil (W. M. Mann).....1 specimen

Ischiodontus ichthydius Cand.
Manaos, Brazil (Mann & Baker).....1 specimen
Previously only recorded from Central America and Mexico.

Ischiodontus subsericeus Cand.
Pará, Brazil (W. M. Mann).....1 specimen

Pyrophorus noctilucus (Linn.) Esch.
Madeira-Mamoré R. R. Co. Camp 39, Rio Madeira, Brazil (Mann & Baker)
1 ♂, 1 ♀ specimen
Common in all parts of intertropical America.

Pyrophorus amplicollis Cand.
Madeira-Mamoré R. R. Co. Camp 39, Rio Madeira, Brazil (Mann & Baker)
1 ♀ specimen

Cardiorhinus bilineatus (Fab.) Germ.
Pará, Brazil (W. M. Mann).....1 specimen

Cardiorhinus cuneatus Cand.
Manaos, Brazil (Mann & Baker).....1 specimen

Cardiorhinus castanipennis Germ.
Manaos, Brazil (Mann & Baker).....1 specimen

Trichophorus crassus (Cand.) Schw.
Abuná, Rio Madeira, Brazil (Mann & Baker).....1 specimen

Horistonotus elegans (Sol.) Cand.
Natal Brazil (W. M. Mann).....2 specimen

Monocrepidius brunnipennis Cand.
Independéncia, Parahyba, Brazil (Mann & Baker).....1 specimen

Monocrepidius stigmosus Germ.
Independéncia, Parahyba, Brazil (Mann & Heath).....1 specimen

Monocrepidius madierensis sp. nov.
Rio Madeira, Brazil (Mann & Baker).....1 specimen

Monocrepidius bakeri sp. n.
Rio Madeira, Brazil (Mann & Baker).....1 specimen
Aeolus testudineus Champ.
Itacoatiara, Amazonas, Brazil (Mann & Baker).....1 specimen
The only other locality known is that of the two cotypes;
Paso Antonio, Guatemala, (Champ.).
Aeolus biplagiatus Cand.
Independéncia, Parahyba, Brazil (Mann & Heath).....8 specimens
Ceará-mirim, Rio Grande do Norte, Brazil (W. M. Mann).....1 specimen
Heteroderes laurentii (Guer.) Cand.
Porto Velho, Rio Madeira, Brazil (Mann & Baker).....52 specimens
Rio Madeira, Brazil (Mann & Baker).....3 specimens
Itacoatiara, Amazonas, Brazil (Mann & Baker).....1 specimen
Pará, Brazil (W. M. Mann).....1 specimen
Drasterius manni sp. n.
Independéncia, Parahyba, Brazil (Mann & Heath).....4 specimens

The single specimen of *Semiotus furcatus* (Fab.) Lap. (Fig. 1, b) is a remarkable variety, as it is undoubtedly the intermediate between typical *furcatus* (Fig. 1, a) which inhabits eastern Amazonas, Venezuela, Guiana, etc., and *S. bilineatus* Cand. (Fig. 1, c) which is indigenous to Colombia. *S. fulvicollis* Blanch. (Fig. 1, d) is but a variety of *furcatus*, separated on the furcation of the marginal black vitta being carried to the tip of the elytron, thereby making a submarginal vitta. In typical *furcatus* the marginal vitta is furcate to beyond the middle and the thoracic vitta is narrowly fusiform. In *S. bilineatus* the vitta is completely fused and the thoracic vitta is oval, and covers more than one third of the notum. The specimen in this collection and another similar specimen in my collection, taken at Pebas, Peru, the lateral marginal vittæ are similar to those of *furcatus* but the dorsal vittæ are similar to *S. bilineatus*.

The series of specimens of *Chalcolepidius candezei* Dohrn. include two very distinct varieties and one intermediate. The typical form collected at Abuná and Camp 39 has the strial vittæ thickly beset with whitish colored scales, and the prothorax and ventral surfaces with bronze purple scales.

Var. b. collected at R. R. Camps 35, 39, 41, and 43 has the elytral interstrial spaces clothed with metallic green scales and striæ beset with deep ferruginous scales, the thorax and ventron clothed with metallic green scales. Var. a. collected at Porto Velho is

intermediate between the other two. It has elytra like the *forma typica* and the rest of the vestiture similar to var. b.

Ischiodontus ichthydius Cand. is quite common in Mexico and Central America, but this is the first record I have seen of the collection of the species in continental South America. The collecting of *Aeolus testudineus* Champ. from Amazonas is remarkably interesting, inasmuch as this species is unknown in literature, except for the two cotypes mentioned by Champion[1] from Guatemala.

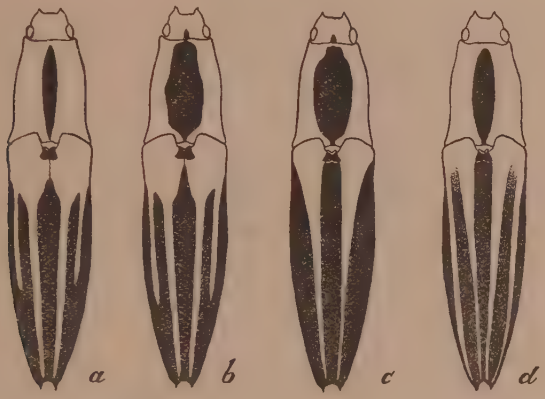


Fig. 1. Species of *Semiotus;* a. *S. furcatus;* b. *S. furcatus,* var.; c. *S. bilineatus;* d, *S. fulvicollis.*

Horistonotus elegans (Sol.) Cand. is recorded only from Chilki by Candèze.

Drasterius manni sp. nov. (Pl. V, Fig. 1a).

Piceous black, moderately densely greyish pilose, pile long. Anterior part of front, anterior angles of the prothorax, anterior angles and tip of elytra, obscurely reddish brown, under parts castaneous, legs dusky yellow, antennæ yellowish ferruginous. Front strongly umbilicate punctate, pronotum densely on sides and sparsely on disc umbilicate punctate (Pl. V, Fig. 1b). Posterior angles very short and almost rectangular, not carinate. Deep incision on posterio margin of pronotum near posterior angles. Propluræ moderately densely umbilicate-punctate, punctures elongate near the sutures (Pl. V, Fig. 1d) becoming round as they approach the side margins. Prosternum with but few scattered simple punctures almost without punctuation. Scutellum pentagonal. Posterior coxal plates (Pl. V, Fig. 1c) very abruptly widened near middle but without median tooth, outwardly incomplete. Elytra punctate striate, strial punctures elongate and about as dis-

[1] Biol. Centr. America, Vol. III, Coleop., p. 362, 1895.

tantly placed as the interstitial spaces. Interstices almost flat, not punctate, feebly rugose. Joints of tarsi (Pl. V, Fig. 1e) gradually decreasing in length from first to fourth. Ungues with basal angles strongly produced (Pl. V, Fig. 1f) Antennal joints two and three sub-equal, sylindrical, three almost as long as four. Joints four to ten elongate triangular, joint eleven suboval not strongly constricted.

Length, 3 to 4 mm.

Type locality: Independéncia, Parahyba, Brazil.

Type: No. 9048 deposited in Mus. Comp. Zoöl., Harvard University.

Paratypes: Three specimens from type locality.

Type and paratypes collected by Messrs. W. W. Mann and Harold Heath.

This species, which is named in honor of Dr. W. M. Mann, will fall near *Drasterius pullatus* Cand. in Candèze's Monograph.

Monocrepidius madeirensis sp. nov. (Pl. V, Fig. 2a).

Moderately elongate, depressed, length four and two-third times width, moderately dense and finely yellow pubescent. General color reddish yellow or amber. Head concolorous with body, marked by two parenthesis-shaped infuscate vittæ on vertex, eyes dark brown; pronotum with a pair of parenthesis-shaped dark brown vitta which attain the anterior margin. Elytra slightly darker than the prothorax with two brown transverse bands, one before the middle and the other halfway between this band and the apex, and a median longitudinal vitta which extends from the scutellum to the anterior transverse band. Scutellum and humeral angles yellow. Ventron brownish yellow. Legs and antennæ yellow. Front slightly convex, finely punctate, anterior margin feebly rounded, terminal joint of maxilliary palpi securiform. Antennal joints two and three small, together not quite equal to four, joint three longer than two (Pl. V, Fig. 2b). Prothorax longer than broad, sides feebly rounded, convergent anteriorly from middle, quite depressed, pronotum with slightly unequal punctuation; posterior angles very slightly divergent, unicarinate, carina almost fused with lateral margin to base of posterior angles where they diverge, carina not much longer than angles. Elytra two and one-fourth times length of prothorax, almost as wide as latter, punctate striate, interstices slightly convex, not spinose at tips. Fourth tarsal joint (Pl. V, Fig. 2c) bearing a large broad lobe easily seen from above.

Length, 7 mm.

Type locality: Rio Madeira, Brazil.

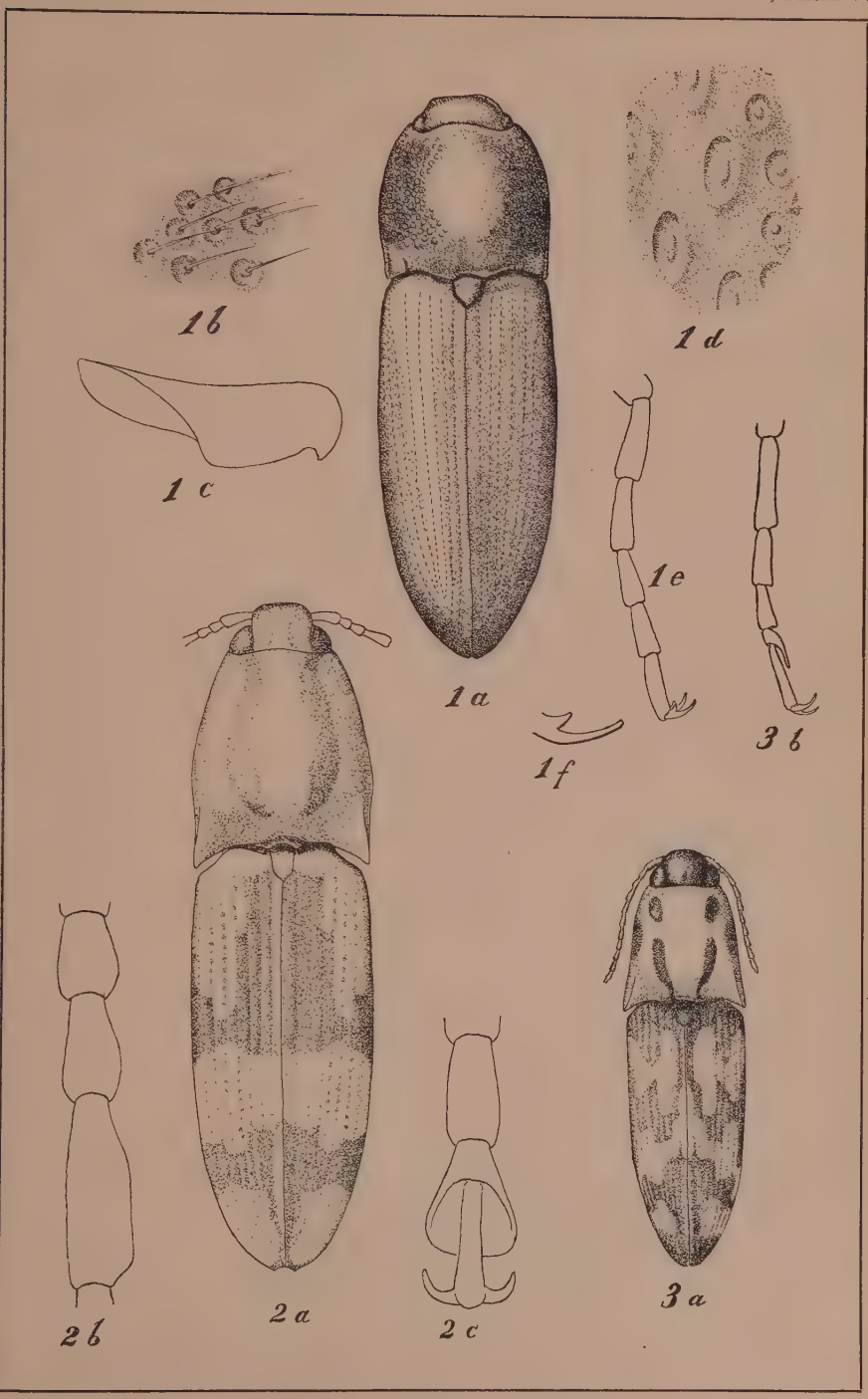
Type: No. 9047 Mus. Comp. Zoöl. Harvard University.

Type collected by W. M. Mann and F. Baker.

This species is named from the type locality and is near *depressipennis* Cand.

Monocrepidius bakeri sp. nov. (Pl. V, 3a).

Elongate, slender, three and one-half times as long as broad, moderately convex, vestiture yellow, dense and very fine. General color infuscate amber; head black, labrum black, antennæ amber, under parts of head and palpi yellow; pronotum



HYSLOP—New species of *Elateridæ*.

amber with four black fascia on disc and another pair near middle of sides almost attaining the lateral margins, the anterior discal fascia do not attain the anterior margin and are bluntly oval, the posterior pair are convergent posteriorly and are produced to attain the posterior margin. Elytra amber colored with black areas disposed as follows: humeral angles and scutellum and its cavity forming an irregular transverse band across the base; elongate area on each side margin near middle with a sinuate band connecting them with the median vitta which extends backward from the scutellum; posterior third except for two lateral rounded spots. Prosternum and flanks amber, prosternal sutures black, remainder of ventron dark brown, legs except coxæ yellow. Front convex, anterior margin broadly rounded, moderately punctate. Antennæ with joints two and three subequal, together equal to four. Pronotum not tuberculate at base, moderately evenly sparsely punctate; posterior angles unicarinate, carina distinct to apex of posterior angles where it joins the lateral margin. Elytra not spinose at tip. Prosternum finely punctate, flanks coarsely punctate. Last abdominal segment similar in punctuation to preceding segments. Tarsal joint four (Pl. V, Fig. 3b) with a moderately long slender lobe, not visible from above.

Length, 5 mm.

Type locality: Rio Madeira, Brazil.

Type: No. 9046 Mus. Comp. Zoöl. Harvard University.

Type collected by W. M. Mann and F. Baker.

This species which I have named in honor of Dr. Baker is near *Monocrepidius pictus* Cand. but is easily distinguished from this species by the absence of the basal pronotal tubercle.

EXPLANATION OF PLATE V.

Fig. 1. *Drasterius manni;* a. dorsum of adult; b. pronotal sculpturing; c. posterior coxal plate; d. propleural sculpturing; e. tarsus; f. tarsal claws.

Fig. 2. *Monocrepidius madeirensis;* a. dorsum of adult; b. second, third, and fourth antennal joints; c. third, fourth, and fifth tarsal joints.

Fig. 3. *Monocrepidius bakerei;* a. dorsum of adult; b. tarsus.

A PSYLLID GALL ON JUNCUS (*LIVIA MACULIPENNIS* FITCH).[1]

By Edith M. Patch.

Since 1857 when Fitch described this beautiful little insect, nothing more definite in regard to its habits has been recorded than that it is found in swampy places. Thomas in 1879 said that it was "found on the sweet-flag," but there is nothing in his account which would indicate that it fed upon that plant.

[1] Papers from the Maine Agricultural Experiment Station: Entomology, No. 82.

This past summer, however, the secret of its habitation was discovered by Miss Cora H. Clarke of Boston, who made an interesting collection of Juncus galls near Magnolia Village, Mass., on August 17, which she shared with the writer. At this date the galls contained only unknown nymphs of a Psyllid but they were about ready to wing and the adults began to emerge in large numbers on August 20–21. These proved to be *Livia maculipennis* Fitch.

The accompanying photograph gives the enlarged abnormal growth of the galled-specimen in contrast to the normal rush, and makes a description unnecessary.

Did Fitch, nearly sixty years ago, pick a stem of rush with its monstrous tassel deserted by its colony and wonder "What did that?" while the little "spotted wings" were flitting about the marsh or resting perchance upon sweet-flag near by?

THE COCCIDÆ OF NEW JERSEY GREENHOUSES.

By Harry B. Weiss,
New Brunswick, New Jersey.

While greenhouse coccids are not strictly a part of the New Jersey fauna, yet many of them are more or less permanently established and are a constant source of annoyance and expense to various growers. Except for the "mealy bugs" and a few species of "soft" and "armored scales," many of them are difficult to control and most of the insecticides recommended for greenhouse use are ineffective. Many of them will kill larvæ but here their usefulness ends. Many have been recommended by hearsay, on the basis of too little investigation, or after experimentation of a meager kind which neglected to include atmospheric conditions and other factors of a more or less variable nature which have an important bearing on the success or failure of the material.

As a result, the most effective work in combating scale insects in greenhouses is done when the plants are overhauled and repotted. At this time badly infested plants are destroyed, infested leaves pulled off, and men and girls are placed at work scrubbing the leaves with tooth brushes, erasers and soft cloths or using pointed sticks to dislodge the scales in cracks and crevices. In other words,

Two stems of rush, one with normal inflorescence contrasted with the large galled specimen showing the work of *Livia maculipennis*.

laborious hand methods are still the fashion in many greenhouses, not from choice but of necessity.

The following list consists of species which have been definitely found infesting various plants in New Jersey greenhouses. No attempt has been made to give a complete list of food plants, and only those on which the insects were found are recorded. To Mr. E. R. Sasscer, I am indebted for various identifications during the past several years.

ICERYA Sign.

I. purchasi Mask. On acacia, orange, lemon.

ORTHEZIA Bosc.

O. insignis Dougl. On coleus, gardenia, verbena, citrus, chrysanthemum, tomato and other plants.

PSEUDOCOCCUS Westw.

P. citri Risso. On bouvardia, coleus, citrus, fuchsia, croton, ferns, bay trees, tomato, palms, geranium and many others.
P. longispinus Targ. On ferns, citrus, palms, dracena, coleus and many others.
P. pseudonipæ Ckll. On Kentia sp. and Cocos sp.

CEROPLASTES Gray.

C. cirripediformis Comst. On citrus.
C. floridensis Comst. On citrus, oleander.

EUCALYMNATUS Ckll.

E. tessellatus Sign. On palms.

COCCUS Linn.

C. hesperidum Linn. On bay trees, oleander, crotons, begonias, palms, ficus, citrus, cyclamen, orchids, camellia and many others.
C. longulus Dougl. On citrus, ficus, euphorbia, ferns and others.
C. pseudohesperidum Ckll. On orchids (Cattleya and Dendrobium spp.)

SAISSETIA Depl.

S. hemisphærica Targ. On palms, ferns, oleander, croton, orchids, citrus camellia and many others.
S. oleæ Bern. On camellia, citrus.

DIASPIS Costa.

D. boisduvalii Sign. On palms, orchids.
D. bromeliæ Kern. On pineapple, oleo fragrans, latania.

AULACASPIS Ckll.

A. zamiæ Morg. On cycas revoluta.

HEMICHIONASPIS Ckll.

H. aspidistræ Sign. On ferns, aspidistra, pandanus, orchids.

FIORINIA Targ.

F. fioriniæ Targ. On camellia, palms, ficus, orchids and others.

ASPIDIOTUS Bouché

A. britannicus Newst. On bay trees.
A. cyanophylli Sign. On palms, orchids, ficus.
A. hederæ Vall. On orchids, palms, cycads, oleander, citrus, ivy and many others.
A. rapax Comst. On bay trees, palms, camellia.

CHRYSOMPHALUS Ashm.

C. aonidum Linn. On palms, pandanus, ficus, bay trees, camellia, citrus.
C. aurantii Mask. On citrus, palms, pandanus.
C. dictyospermi Morg. On palms, pandanus, latania.
C. perseæ Comst. On orchids.
C. rossi Mask. On orchids.

TARGIONIA Sign.

T. biformis Ckll. On orchids.

LEPIDOSAPHES Schimer.

L. beckii Newm. On citrus, croton.
L. gloverii Pack. On palms, citrus.

ISCHNASPIS Dougl.

I. longirostris Sign. On palms, pandanus.

PARLATORIA Targ.

P. pergandii Comst. On citrus.

The above list verifies most of the records furnished by Dr. W. E. Britton for Smith's 1909 list of "The Insects of New Jersey," and increases the number of greenhouse species from nineteen to thirty-two.

THE HOST OF *ZELIA VERTEBRATA* (DIPTERA, DEXIIDÆ).

By J. A. Hyslop,
Bureau of Entomology.

In the April number of this JOURNAL, Volume 22, No. 2, the writer published some observations on the life history of *Meracantha contracta* Beauv. At that time two parasites of this insect were recorded. A third parasite has since been reared, namely, *Zelia vertebrata* (Say). Mr. W. R. Walton in determining this

insect said: "The habits of this fly have hitherto been unknown though it is very common in the woods, in fact, one can hardly go into the forest anywhere in this part of the country (about Washington, D. C.), particularly during the months of July and August, without finding this fly sitting around on tree trunks. The females are quite different in appearance from the males." I therefore think it advisable that what little data we have relative to the habits of this *Dexiid* be published.

On April 6, 1915, two larvæ of *Meracantha* were collected under the club moss, *Polytrichium ohiœnsis*. A parasite emerged from one of these larvæ and pupated on May 10 and the adult fly emerged on June 7.

The other larva moulted on May 15 and appeared to be in good health. However, on June 22 a parasite emerged from this lava and pupated. On July 9 an adult *Zelia vertebrata* emerged. These parasitic larvæ had spent at least six weeks within their hosts, and the puparium stage covered from seventeen to twenty-seven days.

DR. FREDERICK WILLIAM RUSSELL.

Dr. Frederick W. Russell, a former member of the Cambridge Entomological Club, died at the residence of his son-in-law, Dr. Frank J. Hall, Dallas, Texas, November 20, 1915, aged seventy-one.

He graduated from Harvard in 1869 and from the Medical Department of the New York University in 1871. A resident of Winchendon, Mass., for many years, he frequently attended the meetings of the club even from that distance. As a member of the Boston Society of Natural History he took a great interest in the work of building up the New England collection of insects and contributed many rare and interesting moths —the group in which he was especially interested. He was a genial friend and companion and the club wishes to express its sorrow in the loss of a friend and fellow-worker.

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The undersigned will greatly appreciate receiving records of New Jersey species not listed in Smith's Insects of New Jersey.—Harry B. Weiss, 272 Hale St., New Brunswick, N. J.

Offered for cash, but exchange preferred. Fitch and early Illinois reports; Insect Life; Harris's Insect; many others.—J. F. Hallinen, Cooperton, Okla.

Histeridæ. North American Histeridæ identified or unidentified, desired in exchange for beetles of other families. F. G. Carnochan, Bussey Institution, Forest Hills, Massachusetts.

Hemiptera-Heteroptera. I desire specimens of this group from all regions, especially New England. I will give in exchange species of this and other orders (except Lepidoptera), and will identify New England material. Correspondence desired.—H. M. Parshley, Bussey Institution, Forest Hills, Mass.

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